Qi Heng HO   Email: qi.ho@colorado.edu

Education

2020–Present	PhD in Aerospace Engineering Sciences (Autonomous Systems) Advised by Zachary Sunberg and Morteza Lahijanian University of Colorado Boulder
2020–2023	M.S. in Aerospace Engineering Sciences (Autonomous Systems)
2015–2019	B.Eng Mechanical Engineering (Honours with Distinction) National University of Singapore

Appointments

2020–Present	Graduate Research Assistant, Autonomous Systems, University of Colorado Boulder
2019	Research Engineer, Autonomy Group, Singapore-MIT Alliance for Research and Technology (SMART) Centre
2018	Singapore-MIT Undergraduate Research Fellow, SMART Centre
2017	Research and Development Intern, Sivantos Group

Research Projects

2020–Present — **Fast Planning under Uncertainty for Complex Tasks**
PI: Zachary Sunberg and Morteza Lahijanian

- Sampling-based planning algorithms for Gaussian POMDPs and Non-deterministic Hybrid Systems.
- Algorithms for cost and temporal logic Constrained POMDPs.
- Planning with temporal logics (Linear Temporal Logic, Signal Temporal Logic).

2019–2019 — **Multi-Target Tracking for Maneuvering Vehicles**
PI: Daniela Rus and Marcelo H. Ang. Jr.
Singapore-MIT Alliance for Research and Technology Centre

- Designed multi-object detection, estimation and tracking framework for multiple maneuvering vehicles using Interactive Multiple Models.

2018–2021 — **Behavior, Context and Intention Aware Planning under Uncertainty for Urban Driving**
PI: Marcelo H. Ang Jr., Daniela Rus , David Hsu, Malika Meghjani
Bachelor of Engineering Dissertation, Dept. of Mechanical Engineering, National University of Singapore

- Worked on sampling-based online POMDP planning under uncertainty.
- Developed driver behaviour inference algorithms for self-driving car POMDP planning.
- Developed a novel context and intention-based state transition model.
- Validated algorithms on a self-driving car on public roads.

2018 — **Singapore-MIT Undergraduate Research Fellowship: Technologies of Autonomy**
PI: Daniela Rus, Singapore-MIT Alliance for Research and Technology

- Developed mobile robot utilising vision-based SLAM for navigation in crowded spaces.
- Implemented CNN-based object detection for socially aware navigation.

2018   **String stability of vehicle platoons**
PI: Johan Lofberg, Linköping University

- Developed prototypes and validated various control strategies.

2017   **Nanosatellite Development - Galassia 2**
PI: Luo Sha
Innovation and Design Centric Programme, National University of Singapore

- Helped in development of remote agricultural imaging 3U Cubesat, Galassia 2 (launched in 2023)
- Worked on satellite attitude control and determination system using reaction wheels, developed crop health image processing methods.

Selected Honors and Awards

2023	Young NUS Fellow - NUS Development Grant
2023	CU Boulder Graduate School Student Travel Grant
2020	Dean's Graduate Assistantship
2020	AES Departmental Fellowship
2019	NUS 33rd Annual Faculty of Engineering Innovation and Research Award - Silver
2018	Singapore-MIT Undergraduate Research Fellowship
2018	NUS Awards for Studying Abroad - NASA Exchange Scholarship

Publications

Preprints/Under Review (* denotes equal contribution)

1. **Qi Heng Ho***, Tyler Becker*, Benjamin Kraske, Zakariya Laouar, Martin Feather, Federico Rossi, Zachary Sunberg, and Morteza Lahijanian, "Recursively-Constrained Partially Observable Markov Decision Processes". (Under Review)

2. **Qi Heng Ho**, Zachary Sunberg, and Morteza Lahijanian, "Sampling-based Reactive Synthesis for Nondeterministic Hybrid Systems". (Under Review)

3. Zakariya Laouar, Rayan Mazouz, Tyler Becker, **Qi Heng Ho**, and Zachary Sunberg, "Safe Feasibility-Guided MPC for Stochastic Hybrid Systems". (Under Review)

Peer Reviewed Publications (* denotes equal contribution)

1. **Qi Heng Ho**, Zachary Sunberg, and Morteza Lahijanian. "Planning with SiMBA: Motion Planning under Uncertainty for Temporal Goals using Simplified Belief Guides". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2023.

2. Anne Theurkauf, **Qi Heng Ho**, Roland Ilyes, and Morteza Lahijanian. "Chance-Constrained Motion Planning with Event-Triggered Estimation". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2023.

3. Roland Ilyes, **Qi Heng Ho**, and Morteza Lahijanian. "Stochastic Robustness Interval for Motion Planning with Signal Temporal Logic". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2023.

4. **Qi Heng Ho**, Roland Ilyes, Zachary Sunberg, and Morteza Lahijanian. 2023. Poster Abstract: Sampling-based Approach to Robust STL Synthesis for Complex Systems under Uncertainty. In Proceedings of the 26th ACM International Conference on Hybrid Systems: Computation and Control (HSCC), 2023.

5. **Qi Heng Ho**, Roland Ilyes, Zachary Sunberg, and Morteza Lahijanian. "Automaton-Guided Control Synthesis for Signal Temporal Logic Specifications". In IEEE Conference on Decision and Control (**CDC**), 2022.

6. **Qi Heng Ho**, Zachary Sunberg, and Morteza Lahijanian, "Gaussian Belief Trees for Chance Constrained Asymptotically Optimal Motion Planning". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2022.

7. Yuanfu Luo*, Malika Meghjani*, **Qi Heng Ho***, David Hsu, Daniela Rus. "Interactive Planning for Autonomous Urban Driving in Adversarial Scenarios". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2021.

8. Hongliang Guo, Zefan Huang, **Qi Heng Ho**, Marcelo Ang, and Daniela Rus. "Autonomous Navigation in Dynamic Environments with Multi-Modal Perception Uncertainties". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2021.

9. Malika Meghjani, Yuanfu Luo, **Qi Heng Ho**, Panpan Cai, Shashwat Verma, Daniela Rus, and David Hsu. "Context and Intention Aware Planning for Urban Driving". In IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (**IROS**), 2019.

10. Malika Meghjani, Shashwat Verma, You Hong Eng, **Qi Heng Ho**, Daniela Rus and Marcelo H. Ang Jr. "Context-Aware Intention and Trajectory Prediction for Urban Driving Environment". In IFRR Int. Symposium on Experimental Robotics (**ISER**), 2018.

Lightly Reviewed Publications

1. **Qi Heng Ho**, Zachary Sunberg, and Morteza Lahijanian, "Gaussian Belief Trees for Probabilistic Signal Temporal Logic Planning", Robotics Science and Systems (RSS) Workshop on Risk Aware Decision Making: From Optimal Control to Reinforcement Learning, 2022.

Service

Organizer	RSS 2023 Workshop on Inference and Decision Making for Autonomous Vehicles (IDMAV)
Reviewer	CDC, IROS, ICRA, RA-L, AAAI FSS

Extracurricular

2022-2023	Mentor for High School Student

- Mentored a Boulder Valley High School student on a high school research project